great spaces in which the stars are distributed by the Chinese are figured and described. To this atlas there is a full explanation, so that any group of stars mentioned in Chinese astronomy may be readily found by means of the index to the names; and the accordance of these groups with our constellations, is also made clear by means of reduced copies of the figures in Flamsteed's Atlas, with the Chinese asterisms laid down on the corresponding stars. There are many other interesting particulars mentioned in these introductory remarks which time did not allow to be entered upon, particularly an enumeration of the subjects treated of in the sections and chapters of the astronomical division of the history of the Ming dynasty 1368–1644, which, among other matters of interest, contain not only cometary observations, but also a catalogue of stars, with their longitudes and latitudes, both on the equator and the ecliptic, and more than seventy pages of observations of occultations of stars by the Moon and the planets.

Mr. Williams concluded by expressing his conviction that in placing this volume in the library of the Society he had secured it a position in which it is the most likely to be of service in future investigations into the subject of Chinese astronomy.

On Auroral Appearances and their Connexion with the Phenomena of Terrestrial Magnetism. By Balfour Stewart, F.R.A.S.

Some years since I ventured to suggest that auroral displays might be secondary currents due to small but rapid changes, caused by some unknown influence in the magnetism of the Earth. In developing this idea, the Earth was compared to the core of a Ruhmkorff machine, and the moist upper strata of the Earth, as well as the upper strata of the atmosphere, to secondary conductors, in which currents will take place whenever the magnetism of the Earth changes from any cause. These views would appear to be confirmed by the very interesting records of earth-currents obtained by Mr. Airy at the Greenwich Observatory, in which it is found that during times of great magnetic disturbance there are strong earth-currents alternating from positive to negative, the curves lying nearly equally on both sides of the zero.

A further development of this idea has lately occurred to me, in consequence of a remark of my friend Mr. Lockyer, that the zodiacal light may possibly be a terrestrial phenomenon, and may therefore be somehow connected with the phenomena of terrestrial magnetism. For not only will secondary currents be caused in a stationary conductor in presence of a magnetic core of variable power, but also in a conductor moving across the lines of force of a constant magnet. The question arises, have we on the Earth such moving conductors? In answer to this, let us reflect what takes place at the equator. When once the anti-trades have reached the upper regions of the atmosphere,

they will become conductors from their tenuity ; and as they pass rapidly over the lines of the Earth's magnetic force we may expect them to be the vehicles of an electric current, and possibly to be lit up as attenuated gases are when they conduct electricity. May not these form the Zodiacal light ?

Such moving currents will of course re-act on the magnetism of the Earth. We may therefore suppose that somewhat sudden and violent changes are likely to take place in the Earth's magnetism at those seasons at which the Earth's great wind-currents change most rapidly. May not this account for the excess of disturbances at the equinoxes ?

Besides the anti-trades there are also no doubt convection currents caused by the daily progress of the Sun taking place in the upper regions of the Earth's atmosphere. May not these also be the vehicle of currents as they cross the lines of the Earth's force, and account, to some extent at least, for the daily variations of terrestrial magnetism ? and may not this be the reason of the likeness observed by Mr. Baxendell between the curves denoting the daily progress of the wind and those denoting the variation of the declination magnet ? Such currents, in as far as they are electric conductors, taking place in the upper regions of the atmosphere would not be felt by the earth-current wires at Greenwich, and I think Mr. Airy has noticed that this is the case. But the tidal wave represents a motion of a conductor on the Earth's surface, with two periods in one lunar day. This motion cannot produce a very great secondary current, but may it not be sufficient to account for the lunar-diurnal magnetic variation, which is also very small ?

Such a current taking place in a conductor electrically connected with the Earth's upper surface ought to be felt by the Greenwich wires, and, if I am not mistaken, Mr. Airy has detected a current of this nature.

May we not also imagine that there are two varieties of Aurora, one corresponding to stationary conductors under a very rapidly changing core, and the other to rapidly moving conductors under a constant core ? And might not an Aurora of the latter kind indicate the approach of a change of weather ?

These remarks are thrown out in order to invite comment and criticism, and they will have served their purpose if they direct attention to the part that may be played by moving conductors in the phenomena of terrestrial magnetism. It will be noticed that these remarks do not touch upon the mysterious and interesting connexion believed to exist between magnetic disturbances and the frequency of solar spots.

P.S.—Since writing the above, Sir W. Thomson has called my attention to a paper by him in the *Philosophical Magazine* for December 1851, in which it is suggested that moving conductors may play a part in the phenomena of terrestrial magnetism.
